FACT SHEET

Risk Assessment Overview
Ash Grove Cement, Chanute, Kansas **June 2000**

INTRODUCTION: The Environmental Protection Agency (EPA) issued a permit on August 15, 1996, to the Ash Grove Cement Company in Chanute, Kansas, to burn hazardous wastes. The permit allows Ash Grove to burn those wastes for fuel in two cement kilns at the Chanute plant. Before the final permit decision was made, EPA completed an study of the risks posed by emissions from the burning of hazardous wastes at the facility. This study is referred to as the "Multi-Pathway Risk Assessment."

BACKGROUND: EPA Administrator Carol Browner announced the Agency's Waste Minimization and Combustion Strategy in May 1993. EPA's approach, which links ongoing waste minimization policy with combustion issues, focuses on fostering increased waste reduction and reducing emissions associated with the combustion of hazardous wastes. One priority of this strategy requires the use of a risk assessment as an added step in the permitting process for hazardous waste combustion facilities to further ensure the protection of public health. EPA completed the risk assessment in 1995, titled "A Multi-Pathway Risk Assessment for the Ash Grove Cement Kilns in Chanute, Kansas."

RISK ASSESSMENT METHODS: EPA's combustion strategy recommends an assessment of indirect exposure risks (from locally-produced foods) as well as direct risks (such as inhalation) from combustion emissions. The risk assessment is a mathematical description, using computer modeling, of the behavior in the environment of pollutants emitted during combustion. That modeling is used to predict the potential impact on human health. EPA's guidance for risk assessments at hazardous waste combustors evaluates emission rates at maximum allowable levels and uses hypothetical farmers, fishermen, and residents who eat mostly foods produced locally. These foods are produced at sites of predicted maximum air pathway impacts.

The risk assessment is done assuming that someone lives where the maximum exposure is predicted to occur. This location is referred to as the maximum exposed individual (MEI). A MEI is not a real person but represents a person who, based on lifestyle, would have the maximum exposure to combustion emissions. The lifestyle may not actually exist in the surrounding community. An example of a MEI is a subsistence farmer who never leaves his farm during his lifetime; the farm is located at the point of maximum air concentration; and the farmer has never eaten anything other than the beef, milk, and vegetables produced on his farm. The risk assessment would over estimate the risks from emissions to that MEI because an actual farmer would at some time be away from his farm and/or consume food produced elsewhere during his lifetime.

All the risk estimates in the risk assessment report are intended to be that way.

EPA has set targets so combustion will not pose an unacceptable risk to human health or the environment. If the risk assessment estimates that the risk from emissions are below the targets, then the combustion of hazardous wastes is believed to be safe. If the targets are exceeded, EPA will include requirements in the permit to reduce emissions to protect human health and the environment. If emissions cannot be lowered enough so that the targets are not exceeded, EPA will deny the facility's permit.

EPA'S RISK ASSESSMENT: EPA Region 7 in Kansas City, Kansas, completed a risk assessment of emissions from burning hazardous waste in the cement kilns at Ash Grove's facility in Chanute. The risk assessment used the guidance titled, "Guidance for Performing Screening Level Risk Analysis at Combustion Facilities Burning Hazardous Wastes, April 15, 1994." The risk assessment completed by EPA went beyond the Screening Guidance by including site specific information on local waterbodies and adding additional exposure pathways, such as drinking water, that were not included in the guidance document. The risk assessment completed by EPA is sometimes called a "hybrid" risk assessment because site-specific data was used in place of some standard assumptions. This hybrid risk assessment produces results that are more realistic and accurate. However, the conservative nature of the assessment was preserved by using high-end emission rates and the MEI approach described earlier. Site-specific information was used to eliminate some exposure scenarios that were not realistic for the Chanute area.
The emissions from the combustion of hazardous wastes in the two kilns at Ash Grove were measured in trial burns conducted in the Spring of 1994. During these trial burns, the emissions were measured as the kilns were operated under a variety of conditions. In some cases, materials, such as cadmium and lead were added to the hazardous waste feed to test the air pollution controls at the maximum allowable feed rates requested by Ash Grove for its permit. The operating conditions and feed rates in the permit are based on those demonstrated in the trial burns. These operating conditions and feed rates correspond to the maximum emissions allowed from the kilns. Therefore, the risk assessment predicts the worst case risk estimates. Emissions during normal operations of the kilns are lower and will not cause unacceptable risk to human health or the environment.

OVERVIEW OF ASH GROVE'S RISK ASSESSMENT: The first step in EPA's risk assessment for Ash Grove was to identify the sources of potential risk. EPA evaluated the emissions from the two cement kilns burning hazardous waste as the source of potential risk.

The second step was to measure the emissions from the burning of hazardous waste in the two cement kilns. Emission rates were determined using facility operation data (waste throughput and time of operation), waste composition and trial burn data. A trial burn was conducted in order to measure the actual emission rates. The emission rates during the trial burn are the worst case emission rates. This ensures that the risk assessment will not under estimate the risk from emissions.

The third step was to estimate concentration of emissions at the exposure points. Emissions from the smoke stack move

indirectly through the environment to points where human exposure can occur. Examples are: deposition into water that is then consumed by humans; deposition onto soil where they are absorbed by plants which are eaten by cows whose milk and meat are consumed by humans; and washed into lakes and streams to be taken up by fish that are consumed by humans. The risk assessment included indirect pathways such as consumption of above-ground vegetables, below-ground vegetables, beef, milk, fish, water, and soil, as well as direct pathways such as dermal (skin) exposure to water and soil.

The fourth step was to characterize human exposure patterns. There are many factors that determine how much exposure you have to the emissions. These factors include contact rates (i.e. breathing rate, plant ingestion rate), body weights, and exposure times. EPA's assumed that the MEI lives to 70 years of age and that the facility operates for 30 years, during which the MEI is exposed for the entire time of operation. These factors are commonly referred to as the "exposure setting."

The fifth step is to evaluate the appropriate exposure patterns. These are commonly referred to as "exposure scenarios." They are the behavior patterns for a MEI in the exposure setting. EPA used the following exposure scenarios: Resident Child, Resident Adult, Subsistence Farmer, Recreational Fisherman, Resident Nursing Infant. Resident in this case means someone who lives within the area of maximum exposure. An example of the behavior pattern assumptions is the Subsistence Farmer who is presumed to be an adult who consumes all of his beef and milk from animals raised on contaminated foliage (and soil) and eats from a home vegetable garden. The Recreational Fisherman is assumed to eat vegetables from a home garden and eat approximately 1.5 pounds of fish per week. The total exposure for a scenario is determined by summing the exposure through all of the individual pathways that a person might encounter.

The sixth step is to estimate the risk. Both cancer risk and other potential health impacts were evaluated. Two standard indexes where used to measure the potential health risk posed by a pollutant -- the cancer risk and the hazard quotient. EPA believes that a risk of cancer greater than one cancer case in a population of 100,000 (often referred to as "$1x10^{-5}$"risk) and a hazard quotient greater than 0.25 as unacceptable human health risks. The cancer risk is the probability an individual will get cancer from exposure to emissions. The hazard quotient is an evaluation of non-cancer causing emissions. A hazard quotient is a ratio of the estimated daily intake of a contaminant to its reference dose. The reference dose is a threshold concentration quantified for each contaminant based upon critical toxicological effects, such as liver damage, kidney damage, and central nervous system disorders. For chemicals that can have an effect on the same target organ, the effects are added together. If the hazard quotient exceeds one, adverse health effects are expected to occur.

RESULTS: In EPA's 1995 risk assessment for Ash Grove, the only exposure that greatly exceeded acceptable risk criteria was the Recreational Fisherman's exposure to mercury. Again, this predicted exposure level was based on theoretical modeling only, and not on actual data documenting the levels of mercury in fish in the Chanute vicinity. EPA compared the concentrations predicted by the risk assessment to actual mercury concentrations in fish from

Santa Fe Lake. The actual levels of mercury in the fish were lower than the modeled concentrations.

PERMIT APPEAL: EPA issued the permit to Ash Grove and included annual average feed rate limits for metals in hazardous wastes. In addition, environmental monitoring was required for mercury to ensure that risks from those emissions are not present in the Chanute vicinity. The permit was appealed to EPA's Environmental Appeals Board (the "Board") in Washington, D.C. The Board determined that EPA did not provide sufficient information in the record that demonstrates that the permit ensures the protection of human health and the environment from mercury emissions.

Since the Board's determination, EPA has revised its guidance on completing risk assessments. The revised guidance is titled, "Human Health Risk Assessment Protocol for Hazardous Waste Combustion Facilities, EPA530-D-98-001A, July 1998." EPA has also released its report to Congress on mercury titled, "Mercury Study Report to Congress," (EPA-452/R-97-003, December 1997).

With the availability of new information from EPA's report to Congress and the new risk assessment guidance, EPA decided to re-evaluate the risk estimates for mercury. Potential emissions of mercury still exceeded EPA's hazard quotient target of 0.25. EPA determined that it could reduce the mercury feed rate allowed in the permit thereby reducing the hazard quotient to EPA's target.

Getting Involved in the Permitting Process

All persons on the facility permit mailing list receive notification by Ash Grove about requested permit modifications and temporary authorizations. If you would like to know if you are on the facility mailing list or would like to be added to or deleted from the mailing list, please contact EPA or KDHE at the numbers listed below.

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